REMARKS

The Final Office Action mailed on April 14, 2003, has been received and reviewed.

Claims 1-19 are currently pending and under consideration in the above-referenced application. Each of claims 1-19 stands rejected.

Reconsideration of the above-referenced application is respectfully requested.

Rejections Under 35 U.S.C. § 102(b)

Claims 1-4, 9, 14-17, and 19 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent 5,173,220 to Reiff et al. (hereinafter "Reiff").

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single reference which qualifies as prior art under 35 U.S.C. § 102. *Verdegaal Brothers v. Union Oil Co. of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). The identical invention must be shown in as complete detail as is contained in the claim. *Richardson v. Suzuki Motor Co.*, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

Reiff describes use of stereolithography techniques to form structures around other objects, which are referred to therein as "inserts." These "inserts" may comprise a variety of objects, such as assemblies of integrated circuits 72 that have been mounted upon and electrically connected to substrates 74 (*e.g.*, circuit boards). FIG. 4; col. 4, line 52, to col. 5, line 2. In this example, the stereolithographically fabricated structure is referred to as a "chip carrier 70."

Numerous materials may be used in the stereolithographic fabrication processes that are described in Reiff, including metal and plastic powders, chemically reactive materials that cure on exposure to corresponding second chemicals, and liquid photopolymers. Col. 2, lines 62-67. Nonetheless, with regard to the formation of a chip carrier 70 around a substrate 74 with an integrated circuit 72 thereon, *the description of Reiff is limited to the use of cured polymer.* Col. 4, lines 64-67.

Independent claim 1 of the above-referenced application recites a packaged semiconductor device that includes, among other things, a connection element, at least one semiconductor die operably connected to the connection element, and a hermetic package formed from a *hermetic packaging material.*

Hermetic packages and the materials that are used to fabricate hermetic packages are well defined and, thus, well known in the art of semiconductor device packaging. In particular,

hermetic packages are able to pass defined fine vacuum leak tests (*i.e.,* have a leakage rate of less than 10^{-8} cm^3/sec.) and to exclude environmental contaminants, such as moisture, for long periods of time (the military standard for maximum moisture level is 5,000 ppm of cavity volume, while the typical goal in the semiconductor industry is an even smaller 2,000 ppm). Tummalla, R.R., et al., eds., Microelectronics Packaging Handbook (Van Nostrand Reinhold, New York 1989) (hereinafter "Tummalla"), pages 51 and 253; Harper, C.A., Electronic Packaging and Interconnection Handbook (McGraw-Hill, New York 2000, 3d Ed.) (hereinafter "Harper"), page 7.89. Conventionally, materials such as metals, ceramics, and glass have been used to form hermetic packages, with welding, brazing, solder, and glass sealing being used to secure the elements of a hermetic package to one another. Tummalla, at page 51.

It is well known in the art of semiconductor device packaging that moisture diffuses through organic packaging materials, such as polymers. *See* Tummalla, at page 254. Thus, organic packaging, or plastic packaging, such as the type described in Reiff, "is invariably nonhermetic and of lower reliability than [hermetic] packages." Tummalla, at page 728. Use of organic materials such as the UV-curable liquid photopolymer described in Reiff is limited to packaging applications where "hermetic sealing is not a requirement." Harper, at page 7.90.

In view of the foregoing, it is clear that the UV-curable liquid polymer that is described in Reiff is not a "hermetic packaging material," as recited in independent claim 1.

Furthermore, assuming, for the sake of argument, that the chip carrier 70 were formed from metal, since FIG. 4 depicts an integrated circuit 72-substrate 74 assembly that includes exposed bond wires that are contacted by the chip carrier 70, the metal of the chip carrier 70 would cause electrical shorting between the depicted bond wires.

Therefore, it is respectfully submitted that Reiff does not expressly or inherently describe a packaged semiconductor device which includes a hermetic package or a hermetic packaging material. Accordingly, Reiff does not anticipate each and every element of independent claim 1. Thus, under 35 U.S.C. § 102(b), independent claim 1 is allowable over Reiff.

Claims 2-4 and 9 are each allowable, among other reasons, as depending either directly or indirectly from Reiff, which is allowable.

Claim 9 is additionally allowable since Reiff lacks any express or inherent description that the chip carrier 70 described therein may be formed from metal or ceramic. While Reiff teaches, at col. 2, lines 62-67, that the described stereolithographic techniques may be used to form, from metal powder, structures that include inserts, Reiff does not expressly or inherently describe that the chip carrier 70 may be formed from metal. To the contrary, a FIG. 4 depicts an integrated circuit 72-substrate 74 assembly that includes exposed bond wires that are contacted by the chip carrier 70. If chip carrier 70 were formed from a metal, it would cause electrical shorting between the depicted bond wires.

Independent claim 14 is directed to a package for substantially hermetically packaging a semiconductor device. Among other things, independent claim 14 recites that the package comprises hermetic packaging material.

For the same reasons provided above with respect to independent claim 1, it is respectfully submitted that Reiff neither expressly nor inherently describes a package that is capable of substantially hermetically sealing a semiconductor device or a package that comprises a hermetic packaging material. Rather, the description of Reiff is limited to the use of polymers, which are widely accepted as being nonhermetic materials, to form a chip carrier 70 around an integrated circuit 72-substrate 74 assembly.

Moreover, assuming, *arguendo,* that the chip carrier 70 were formed from metal, since FIG. 4 depicts an integrated circuit 72-substrate 74 assembly that includes exposed bond wires that are contacted by the chip carrier 70, the metal of the chip carrier 70 would cause electrical shorting between the depicted bond wires.

As such, Reiff does not anticipate each and every element of independent claim 14. Therefore, under 35 U.S.C. § 102(b), independent claim 14 is allowable over Reiff.

Each of claims 15-17 and 19 is allowable, among other reasons, as depending either directly or indirectly from claim 14, which is allowable.

Claim 19 is additionally allowable since Reiff includes no express or inherent description that the chip carrier 70 described therein may be formed from metal or ceramic. Although Reiff teaches, at col. 2, lines 62-67, that the described stereolithographic techniques may be used to

form, from metal powder, structures that include inserts, Reiff does not expressly or inherently describe that the chip carrier 70 may be formed from metal.

In view of the foregoing, it is respectfully requested that the 35 U.S.C. § 102(b) rejections of claims 1-4, 9, 14-17, and 19 be withdrawn.

Rejections Under 35 U.S.C. § 103(a)

Claims 5-8, 10-13, and 18 stand rejected under 35 U.S.C. § 103(a).

M.P.E.P. 706.02(j) sets forth the standard for a Section 103(a) rejection:

> To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Reiff in View of Eberlein or Suddick

Claims 5-7 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Reiff, in view of U.S. Patent 5,086,334 to Eberlein (hereinafter "Eberlein") or U.S. Patent 3,325,586 to Suddick (hereinafter "Suddick").

Claims 5-7 are each allowable, among other reasons, as depending either directly or indirectly from claim 1, which is allowable.

Reiff in View of Sanford, Eberlein, Finkelstein, Muller, or Suddick

Claims 8, 10-13, and 18 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Reiff, in view of U.S. Patent 4,314,031 to Sanford (hereinafter "Sanford"), Eberlein, U.S. Patent 5,013,360 to Finkelstein et al. (hereinafter "Finkelstein"), U.S. Patent 4,133,690 to Muller (hereinafter "Muller"), or Suddick.

Claim 8 is allowable, among other reasons, as depending from claim 1, which is allowable. Claim 18 is allowable, among other reasons, as depending from claim 18, which is allowable.

Moreover, it is respectfully submitted that claims 8 and 18 are both allowable since the asserted combinations of Reiff with one of Sanford, Eberlein, Finkelstein, Muller, or Suddick do not support a *prima facie* case of obviousness against any of these claims under 35 U.S.C. § 103(a).

In particular, one of ordinary skill in the art would not have been motivated to combine the teachings of Reiff with the teachings of any of Sanford, Eberlein, Finkelstein, Muller, or Suddick.

This is because Reiff does not provide one of ordinary skill in the art with any motivation to use a hermetic packaging material in place of the polymer that is used to form a chip carrier 70 with a plurality of superimposed, contiguous, mutually adhered layers. As is well known in the art of semiconductor device packaging, moisture diffuses through polymers. Thus, polymers, such as the UV-curable liquid photopolymer that Reiff teaches is useful for forming a chip carrier 70, are neither hermetic materials nor materials which are useful in forming hermetic packages. Reiff also teaches that UV-curable liquid photopolymers are weak and brittle, further negating their use in forming hermetic packages. *See* col. 3, lines 45 & 46. In contrast, Sanford, Eberlein, Finkelstein, Muller, and Suddick are drawn to conventional hermetic semiconductor device packages, none of which includes multiple layers that have been formed from glasses.

Moreover, none of Reiff, Sanford, Eberlein, Finkelstein, Muller, Suddick, or the knowledge that was generally available in the relevant art before the priority date of the above-referenced application provides one of ordinary skill in the art with any motivation to substitute the hermetic packaging materials of Sanford, Eberlein, Finkelstein, Muller, or Suddick

for the non-hermetic UV-curable liquid photopolymer of Reiff. Nor does any of this art provide one of ordinary skill in the art with any motivation to use such a material in a substantially hermetic package that includes a plurality of superimposed, contiguous, mutually adhered layers.

As there is no motivational link between Reiff and any of Sanford, Eberlein, Finkelstein, Muller, or Suddick, it is respectfully submitted that any motivation to combine the teachings of Reiff with those of any of Sanford, Eberlein, Finkelstein, Muller, and Suddick could only have been improperly gleaned from the hindsight provided by the disclosure of the above-referenced application.

For these reasons, it is respectfully submitted that, under 35 U.S.C. § 103(a), claims 8 and 18 are both allowable over the combination of Reiff with any of Sanford, Eberlein, Finkelstein, Muller, and Suddick.

Independent claim 10 recites a substantially hermetically packaged semiconductor device that includes a semiconductor die and a package that comprises thermoplastic glass. In addition, the package includes a plurality of superimposed, contiguous, mutually adhered layers.

For the same reason provided above with respect to claims 8 and 18, one of ordinary skill in the art would not have been motivated to combine the teachings of Reiff with those of any of Sanford, Eberlein, Finkelstein, Muller, or Suddick in the manner that has been asserted. In particular, there would have been no motivation for one of ordinary skill in the art, before the earliest priority date for the above-referenced application, to have substituted the non-hermetic, UV-curable liquid photopolymer of the multi-layer chip carrier of Reiff with the glass of the conventionally configured hermetic package of Sanford, Eberlein, Finkelstein, Muller, or Suddick, or for one of ordinary skill in the art to have fabricated a multi-layer package from a substantially hermetic packaging material.

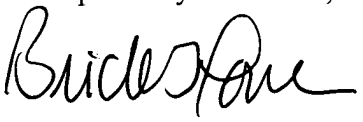
Accordingly, it is respectfully submitted that, under 35 U.S.C. § 103(a), claims 10-13 are allowable over the combination of Reiff with one of Sanford, Eberlein, Finkelstein, Muller, and Suddick.

For the foregoing reasons, withdrawal of the 35 U.S.C. § 103(a) rejections of claims 5-8, 10-13, and 18 is respectfully requested.

CONCLUSION

It is respectfully submitted that each of claims 1-19 is allowable. An early notice of the allowability of each of these claims and an indication that the above-referenced application has been passed for issuance are respectfully solicited. If any issues preventing allowance of the above-referenced application remain which might be resolved by way of a telephone conference, the Office is kindly invited to contact the undersigned attorney.

Respectfully submitted,



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